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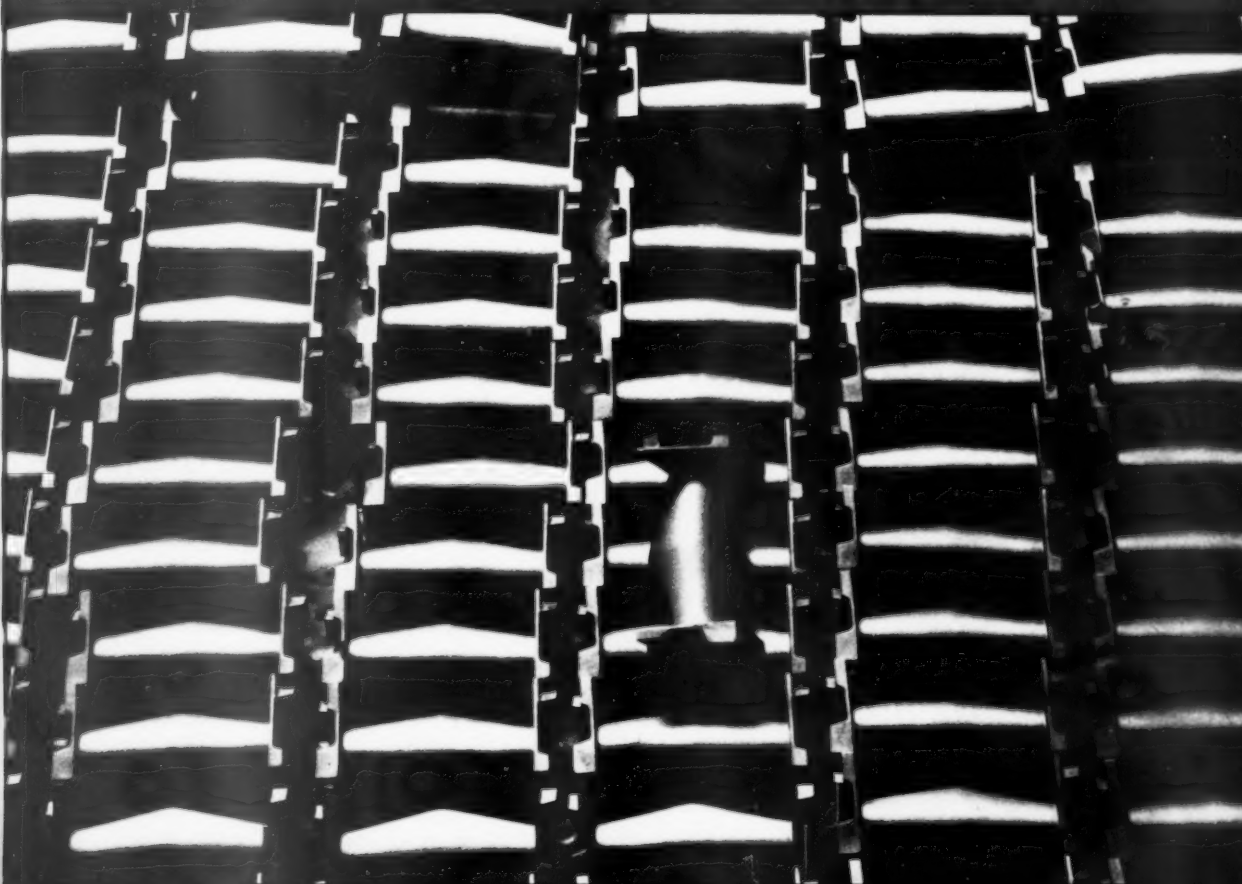
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July 12, 1961

VOL. 85, NO. 4 PAGES 47-64

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Turbine Vanes

See Page 61

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ASTRONOMY

Split Aurora Display

► AN UNUSUAL display of the magnificent Northern Lights split in two parts has been observed.

Drs. G. Sprague and C. W. Gartlein of the IGY Aurora Data Center, Cornell University, Ithaca, N. Y., told SCIENCE SERVICE that an aurora consisting of white and blue lights with long rays hung overhead for more than two hours on the night between July 4 and 5.

The celestial fireworks were divided into two parts, one hanging overhead, the other standing in the northern sky. They were separated by a band of eight to ten times the apparent width of a full moon. The IGY Center had forecast auroras on June 29 and July 4, but no aurora has been reported so far to have occurred on June 29.

The dancing patterns of auroras include flames, which the human eye can observe better than a camera. Visual observation also is the only way to record the color of the individual forms in an aurora.

Blue and green colors can be seen in auroras, even when the light looks white.

High school students interested in science, amateur astronomers and some members of the Weather Bureau, who are part of the Data Center's observing team, are able to see the blue and green in white light by looking at the aurora through filters supplied by the Center.

Observations so far indicate that the flame-like forms in auroras are blue, pulsations are green, arcs and rayed arcs are generally green, and rays are sometimes blue.

The Data Center reports it particularly needs more information on the blue forms and a general description of the blue light in auroras.

Anyone seeing an aurora who is interested in helping scientists solve some of the questions about the relationships of the auroras to the sun should write the Aurora Data Center, Cornell University, Ithaca, N. Y., to become an observer. The Center will send free an instruction book, colored filters for viewing the auroras, report forms and postpaid envelopes.

• Science News Letter, 80:50 July 22, 1961

ASTRONOMY

Gains From Radar Probe

► SCIENTISTS now know how to design a radar observatory for keeping track of the planets Venus, Mars, Mercury and Jupiter.

This knowledge resulted from experiments bouncing a radar beam off Venus almost daily for two months at the Goldstone tracking and communications station of the Jet Propulsion Laboratory, California Institute of Technology, Pasadena.

Such radar observatories would supply much more exact information about the position of the planets than is now available. This is of great importance for space vehicles landing on the planets. Radar observatories might also lead to discovery of minor planets and natural satellites not now known.

Another very important result of receiving echoes from Venus is a more accurate value for the astronomical unit, the distance from earth to the sun, 92,960,800 miles, plus or minus about 1,000 miles. The astronomical unit is very important to all space research since distances to planets are measured by it.

Analyses of the radar signals reflected from Venus indicate the planet rotates very slowly. It takes perhaps as long for one rotation (its length of day) as 225 earth days, which is also one year on Venus, or as long as it takes that planet to travel around the sun.

Radar data indicate that Venus is a better reflector than the moon and has a similar surface roughness. W. K. Victor and R. Stevens, both of Jet Propulsion Laboratory, which is operated for the National Aeronautics and Space Administration, report in *Science*, 134:46, 1961.

They believe the fact that Venus is now within radar range will open up a new field of techniques for mapping the planet, to determine whether its surface is solid or liquid, and to discover and verify the presence or absence of the ionosphere and a magnetic field.

• Science News Letter, 80:50 July 22, 1961

OCEANOGRAPHY

Strong Flow Found In Ocean Near Equator

► A STRONG CURRENT in the Atlantic Ocean depths has been discovered near the equator.

With velocities up to three feet a second, the current flows eastward along the equator in the opposite direction to the weaker surface currents. No exact dimensions of the extent and flow of the current were made.

Scientists on the Woods Hole Oceanographic Institution ship, R. V. Chain, measured the current during a three-month cruise along the equator. Preliminary measurements indicate the current flows eastward at depths ranging from 150 feet to at least 300 feet.

The countercurrent has a similar counterpart in the Pacific Ocean, known as the Cromwell current. Discovered in 1954, the Cromwell current is a 3,500-mile-long ribbon of water.

A net thrown overboard during the R. V. Chain's cruise provided a vivid example of the current's presence. Dr. Arthur D. Voorhis, Woods Hole Oceanographic Institution

scientist, reports in *Nature*, 191:157, 1961.

When the net settled to the 150-foot depth, the eastward current caught the net like a billowing sail, jerking the attached wire towards the east.

• Science News Letter, 80:50 July 22, 1961

OCEANOGRAPHY

Pacific Ocean Depth Averages 18,000 Feet

► THE PACIFIC OCEAN averages 18,000 feet in depth between South America and Tasmania, an Australian island south of Melbourne.

A study of the travel times of the seismic sea waves created by earthquakes, known as tsunamis, showed the 18,000-foot depth. Dr. R. Green of the geology department, University of Tasmania, Hobart, found that the wave generated by the destructive Chilean earthquake of May 22, 1960, took 12 hours to reach Hobart but 14 hours to reach Auckland, N. Z.

Although seismic sea waves are often very destructive in Japan and Hawaii, Dr. Green concluded that it is "very unlikely" a tidal wave will inundate Australian towns. Tsunami waves are slowed down and quickly reduced in size when they enter an area of continental shelf studded with islands, Dr. Green reports in the *Australian Journal of Physics*, 14:120, 1961.

• Science News Letter, 80:50 July 22, 1961

GEOPHYSICS

Era of Global Scientific Cooperation Ushered In

► A NEW ERA of international cooperation among scientists throughout the world is now being ushered in.

Receiving the greatest push from the International Geophysical Year, scientists are now in the midst of international plans for charting the least known ocean, observing the sun's activity during quiet times and probing into inner space—the earth.

More than 20 nations are scheduled to participate in the exploration of the Indian Ocean that has just begun and will last until 1965.

Ships will be criss-crossing the ocean many times in a massive assault that scientists hope will eventually yield the secrets of harvesting the ocean's food to feed the mushrooming population skirting the huge body of water.

Scientists from many countries are involved in discussions about the Upper Mantle Project, which is designed to unlock the secrets of the earth. A unique scientific calendar listing when certain natural events occur and what days to observe them also encourages the world-wide cooperation of scientists.

But the one big gap awesomely evident in international cooperation is in the conquest of outer space. In the race for claiming the many firsts between two countries with contrasting ideologies, the idea of international cooperation has been shoved into the background.

• Science News Letter, 80:50 July 22, 1961

SPACE

Tiros to Spot Hurricanes

Tiros III weather satellite will track hurricanes. Its TV pictures will be used for study of the origin and development of the storms, Tove Neville reports.

➤ A NEW TIROS weather satellite is checking the Atlantic Ocean for hurricanes during the season.

The Tiros III will actually be used as part of the hurricane warning system if it proves capable of taking pictures in which the tropical storms can be identified.

Meteorologists also hope to measure the heat in and around hurricanes with the infrared sensors on the new Tiros. This would add to the information about the energy that drives a hurricane.

Heat radiation studies may also show how much cooling is taking place at the top of clouds and give a rough measure of sea surface temperatures.

The 285-pound Tiros III went into orbit from Cape Canaveral, Fla., July 12, on a path 461 miles from earth when closest, 506 miles when farthest away. It now circles the earth every 100 minutes.

The first pictures from Tiros III show a cyclone system over Labrador and the cloud cover over the St. Lawrence River, the National Aeronautics and Space Administration reported. Both television cameras are working "very well."

Unlike the two earlier satellites, which used both a wide angle and a narrow

angle high resolution camera, Tiros III will have two wide angle cameras. This is because the most important information for weather analysis from the first two weather satellites came from wide angle pictures.

Power for the satellite will be provided by chemical batteries charged by more than 9,000 solar cells. These are mounted on the top and sides of the spacecraft which is 42 inches in diameter and 19 inches high.

A new experiment will be to measure radiation to find how much solar energy is absorbed, reflected and emitted by the earth and its atmosphere. Tiros III carries three radiation experiments, two of which were included in the earlier satellites.

One hundred nations, among them Soviet Russia, are being invited by the United States to use weather information from the new Tiros III satellite.

Nations interested in receiving pictures of cloud formations and storm centers coming their way can participate in a special exchange program of weather observations with the U.S.

Special cloud pictures taken by airplane of local areas in foreign countries, results of radio sonde experiments and radiation observations would be sent to the U.S. In

return, the U.S. will supply pictures taken with the satellite's television cameras.

Dr. F. W. Reichelderfer, chief of the U.S. Weather Bureau, reported that 17 countries participated in exchange of weather information on Tiros II. Weather specialists hope to study the origin and development of hurricanes from Tiros pictures.

Dr. Reichelderfer said that weather information from Tiros III of the cloud cover over the oceans in the Southern Hemisphere will be a great gain since very little weather information is now available from these areas.

Ground stations to receive signals from Tiros III are located at Wallops Island, Va., and at Pacific Missile Range, Calif. An additional station in Santiago, Chile, can trigger the clock that starts the TV picture cameras at times when U.S. stations cannot. The cameras can take pictures, for five hours at a time, from 48 degrees north to 48 degrees south, or as far north and south as Newfoundland and southern Chile.

Tiros is not earth-oriented. Part of the time the cameras point away from earth or the satellite passes the dark part of the earth.

For this reason Tiros III will take pictures of the Northern Hemisphere for about four weeks at a time and will then snap cloud covers in the Southern Hemisphere for four weeks. Weathermen will compare the pictures to their own weather maps made up of information from ground weather stations and weather ships in the oceans.

NASA reported that Tiros II, still in orbit and transmitting, may be silenced if it interferes with the new Tiros. Its solar cells are in excellent condition, but its batteries are showing some wear. Tiros I and II have taken thousands of photographs.

In the planning stage are three more Tiros satellites before the operational, earth-oriented Nimbus weather satellite is launched in a polar orbit that would allow weather readings all over earth once a day. Eventually 24-hour weather satellites, which would stay over the same spots of the earth at all times, could send back continuous weather information.

• Science News Letter, 80:51 July 22, 1961

SPACE

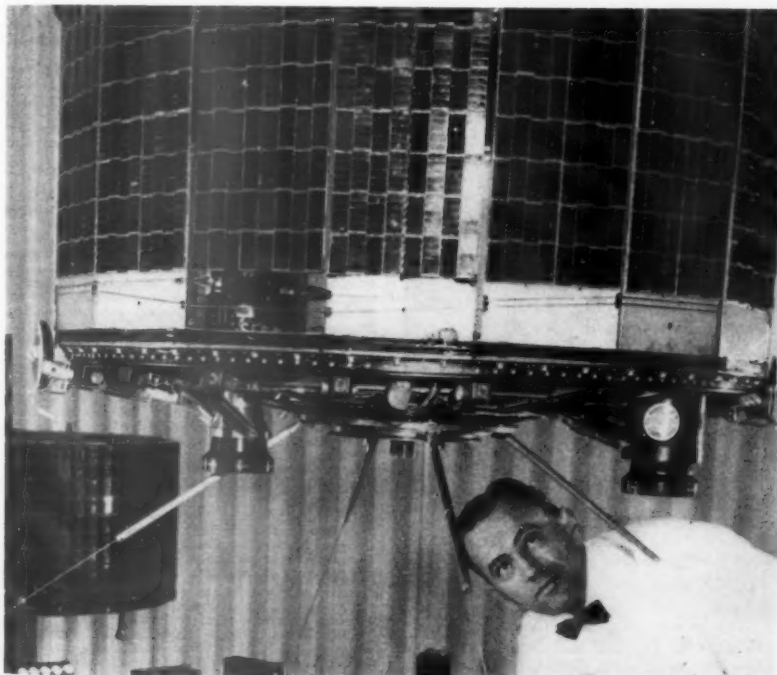
Orbiting Midas Satellite Heaviest for U. S.

➤ THE HEAVIEST space craft launched so far by the United States is the Air Force Midas III sent into a polar orbit 1,850 miles up on July 12.

The Midas reconnaissance satellite, sometimes called the "spy-in-the-sky," carries infrared sensors capable of spotting the heat from enemy missiles. It circles the earth every 160 minutes.

The satellite, boosted by an Atlas rocket, surveys the entire earth as it travels over the poles and the earth rotates beneath it. The Midas (Missile Defense Alarm System) was launched from Point Aguero, Calif. Two earlier Midas satellites were fired from Cape Canaveral, Fla. One failed. The second went into orbit but failed to continue transmitting.

• Science News Letter, 80:51 July 22, 1961



HURRICANE SPOTTER—Weather satellite Tiros III will track hurricanes with two wide-angle television cameras.

SPACE

People May Own Satellite

► COMMUNICATION satellites sending telephone messages and TV across the oceans from people to people could be owned by the people.

Public ownership by subscription has been suggested by General Electric Company for up to 50% of the stock in a new company to be called Communication Satellites, Inc. No more than 10% of this proposed corporation could be owned by any one firm.

Many proposals have been made for operation and ownership of communication satellites. Makers of space vehicles, companies in the electronics field making parts for satellites, the United States Government and the international common carriers, such as American Telephone and Telegraph Company, the International Telephone and Telegraph Corporation and Radio Corporation of America, have been suggested as operators or owners.

The A.T. & T. has at the present time a monopoly on all voice communications going in and out of the U.S. The I.T. & T. has a monopoly on all written data, such as by telegraph, in and out of the country. The RCA has a monopoly on voice communications between foreign countries.

The House Committee on Science and

Astronautics has already held hearings to find out if additional legislation is necessary to deal with the problems of communications satellites.

The National Aeronautics and Space Administration testified on the technical difficulties of putting such satellites into operation. NASA has broad authority in space exploration and has recently given a \$3,000,000 contract to RCA for development of an experimental relay communications satellite to circle the earth at low altitudes.

The Federal Communications Commission, which controls commercial use and ownership of communications, also testified. So did the Office of Civil and Defense Mobilization, which has the responsibility of assigning radio frequencies for Government use.

Other agencies asked to advise the House on further action and problems of the satellites and their uses were the U.S. Information Agency, dealing with the international implications of such a world-wide system, the Defense Department, which is the biggest single user of communications facilities, and the State Department, responsible for U.S. foreign policy.

• Science News Letter, 80:52 July 22, 1961

SPACE

Satellite Tests Silicon

► EXPERIMENTS CARRIED in the recovered capsule of the Discoverer XXVI satellite will show how space affects silicon, which, with oxygen, is sand.

The crystal structure of silicon has been found to change when the non-metallic element is bombarded with protons in space. Since many solar cells powering satellites are made of silicon, it is important to find out how the silicon is damaged.

Discoverer XXVI carried eight chemical elements to be tested in the space environment: silicon, titanium, yttrium, bismuth, magnesium, nickel, iron and lead.

Other scientific experiments in this versatile space package included the study of sources and intensity of radio noise from space, monitoring the angular distribution of cosmic radiation in space, and finding the density of micrometeoroids and ion (charged) particles through erosion of a crystal.

The Discoverer Air Force satellite program was initiated to solve the problems of re-entry into the earth's atmosphere from space. Of the 26 Discoverers so far sent up, 18 went into orbit and 16 carried recoverable capsules, of which six have been recovered.

Ten capsules either took off into space instead of going into orbit or were lost in the ocean.

Several Discoverers have carried and tested devices for the Midas and Samos reconnaissance satellites.

The Discoverer XXVI capsule was recovered in the air northwest of Hawaii by a C-119 plane on July 9 at 10:32 p.m. EDT during its 32nd orbit. It traveled over the poles around the earth every 95 minutes in a path 146 miles away at its closest point and 503 miles up when farthest away.

• Science News Letter, 80:52 July 22, 1961

TECHNOLOGY

Single Computers May Serve Many Companies

► CURRENT DEVELOPMENTS in computing technology will give rise to a new kind of public utility, a Massachusetts Institute of Technology electrical engineer predicts at Cambridge, Mass.

Dr. John McCarthy and others at MIT are working now on methods of enabling a single large, high-speed electronic computer to work on many problems for many users simultaneously. This, he thinks, will be a step toward the establishment of central computing concerns, which will receive data over telephone lines, and transmit weather, economic and other forecasts to their clients.

"The new applications that time-sharing will permit," Dr. McCarthy said, "will be of as much additional benefit to science and to management as the introduction of the stored digital computer in the first place."

When electronic computers were new,

they were used mainly for such time-consuming tasks as preparing mathematical tables. Computers still are given many long runs, but they are being used increasingly now for tasks that they can execute in milliseconds.

Such usage results in more frequent pauses for the user to think, or make a correction, before the machine can proceed. To avoid wasting an expensive machine's time in this way, Dr. McCarthy and others working with him are devising methods of connecting several consoles to a single machine, so several persons can use it simultaneously and thus keep it busy more nearly continuously.

• Science News Letter, 80:52 July 22, 1961

SCIENCE NEWS LETTER

VOL. 80 JULY 22, 1961 NO. 4

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., NOrth 7-2255. Cable Address: SCIENSERV.

Subscription rates: 1 yr., \$5.50; 2 yrs., \$10.00; 3 yrs., \$14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member of Audit Bureau of Circulation.



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AERONAUTICS

Flying Platforms Tested

► MEN WITH NO previous flying experience are able to pilot simple, fan-driven "flying platforms" after practicing only a few minutes, tests conducted at Langley Research Center, Langley Field, Va., show.

The small, one-man "stand-on helicopters" can be controlled successfully with either an airplane-type stick or with the motion of the pilot's body alone.

Somewhat resembling king-size bird cages, the vehicles are powered by a pair of counter-rotating fans, installed under the platform on which the pilot stands or sits. Additional thrust is supplied by four air jets.

The military application is added mo-

bility for ground troops, who would have a simple means of short-range transportation to take them over the roughest terrain.

For the tests, National Aeronautics and Space Administration researchers used ten men, including five with little or no previous flight training and three with extensive experience in fighter aircraft. All the men could "control the vehicle satisfactorily with either system," NASA reported.

Tests consisted of hovering flights and "mild maneuvers" inside a building. An overhead safety cable kept the 130-pound craft from crashing if the pilot trainee lost control. An operator on the ground controlled the platform's thrust and heading.

Generally, flights were smoother when the pilot was seated and used a mounted stick to control pitch and roll. But no one had any major difficulties with control by the simple shifting of body weight, called kinesthetic control and described by NASA as "nearly the ultimate in mechanical simplicity."

Two types of kinesthetic control were tried. In one, the standing pilot gripped a hand bar. In the other, only the pilot's feet touched any part of the machine. The men were more at ease when allowed to grasp the bar.

• Science News Letter, 80:53 July 22, 1961

SPACE

Space Oxygen System

► THE PROBLEM of supplying oxygen to human space travelers is nearly solved. Evidence that the long-sought goal is at hand came in the form of a white mouse that set a new record in space medicine by surviving 66 days in a closed environment where oxygen was supplied entirely by algae. It might have gone on longer, but it drank all the water in the chamber and had to be released.

Various animals, including monkeys, have been maintained on algae for short periods, and previously a mouse stuck it out for 28 days.

The new system was tested by Drs. Russel O. Bowman and Fred W. Thomae of the Chance Vought Research Center in Dallas, Texas.

They sealed a one-year-old, white male mouse weighing 1.37 ounces in a chamber at high noon. In the chamber were a pad of mouse bedding, food and water. A four-quart culture of algae, *Chlorella pyrenoidosa*, was linked to the chamber.

During the 66 days, the percentage of oxygen in the closed atmosphere went from 21% to 63%, carbon dioxide from 0.4% to 0.13% and for some unknown reason, the nitrogen percentage, about 80% in normal air, dropped steadily as the oxygen went up.

Gas analysis showed no accumulation of carbon monoxide, methane or ethane, toxic gases which have caused trouble in previous experiments.

When the mouse was taken from the chamber on Aug. 12, 1960, it weighed 1.53 ounces, a gain of .16 of an ounce, which is a significant amount to a mouse. The high oxygen content of the chamber and the return to normal 21% oxygen apparently caused no ill effects, for the mouse remained healthy for nine months after the experiment ended.

The algae culture also gained weight. The culture was about half a pint larger at the 66th day.

Although the cage was not cleaned, the odor from accumulated wastes "was con-

siderably less than that of an uncleaned cage after one week" in open air, the scientists report in *Science*, 134:55, 1961.

Calculating for the requirements of an averaged-sized man, 100 gallons one percent packed cell volume of algae should support one person. Relatively long-term safety and reliability, the scientists said, have been shown for this system.

• Science News Letter, 80:53 July 22, 1961

ASTRONOMY

"Cold" Stars to Be Sought From Infrared Radiation

► "COLD" STARS may be tracked by an infrared photometer to be built by the Eastman Kodak Company, Rochester, N. Y. Some astrophysicists believe cool stars invisible to the eye may be detected by infrared radiation. Kodak is also preparing a star atlas that shows infrared radiation of known stars and could be handy in space navigation.

To this purpose, infrared-sensing equipment was attached to the 69-inch reflecting telescope at Ohio State University and the first information about the middle wavelength portion of the infrared spectrum was obtained.

• Science News Letter, 80:53 July 22, 1961



CHEMICAL OXYGEN SUPPORTS MOUSE—A house mouse was supported for 80 hours in a cell where its only source of oxygen at a simulated 75,000 feet altitude was potassium superoxide. Stan Hall and C. C. Simms examine the mouse at Lockheed Missiles and Space Company, Sunnyvale, Calif., where the experiment was performed.

MEDICINE

Fluoride for Bone Disease

► SCIENTISTS are now studying sodium fluoride, the material used in city water supplies to reduce tooth decay, to see whether it can be used to "harden" bone.

The new idea stems from the fact that persons who accidentally get far too much fluoride ion over a period of years develop abnormally dense bones. In extreme cases, even their ligaments and tendons become calcified. No one knows why or how such changes take place, but it is believed that fluoride ion somehow depresses the body's normal tendency to absorb old bone as new bone is built.

Dr. Clayton Rich of the Veterans Administration Hospital in Seattle, Wash., and Dr. John Ensink of the University of Washington School of Medicine, also in Seattle, hope to find a way of utilizing this action of fluoride ion in treating bone diseases "where skeletal mass is reduced, the rate of bone resorption accelerated or both."

In studies conducted at the Rockefeller Institute, they found that sodium fluoride pills can cut down drastically the wasting

of calcium. (In patients with osteoporosis, characterized by bone fragility, and Paget's disease, a disabling malady found most frequently in men after middle age, an abnormally large amount of calcium is eliminated, essentially wasted, via the urine.)

In one osteoporosis patient, the scientists report in *Nature*, 191:184, 1961, urinary calcium excretion fell from 204-240 milligrams per day to 24-68 milligrams. At the same time, fecal calcium increased about 80 milligrams per day.

During the 14-week treatment period, two of the seven patients developed bursitis, but there were no other ill effects from the 60-milligram daily dose of sodium fluoride.

"Although these results do not show whether or not fluoride will be useful in treatment of human subjects," the scientists concluded, "they do demonstrate profound effects of fluoride ion upon calcium metabolism of patients with several skeletal diseases."

• Science News Letter, 80:54 July 22, 1961

MEDICINE

Mental Patients Respond

► TREATING MENTAL PATIENTS in general hospitals gives good results, a ten-year follow-up reported in the *British Medical Journal*, July 8, 1961, shows.

Ninety-five patients suffering from schizophrenia, the most common mental disease, showed 75% recovery over the ten-year period, according to Drs. Peter Rohde and William Sargent of St. Thomas's Hospital in London.

"It was surprising to find that no fewer than 82 (86%) of the original 95 patients were out of hospital," the investigators report. "It was equally surprising to find that no fewer than 71 (75%) seemed to be free from evidence of active schizophrenia although 25 (26%) of these show evidence of residual symptoms."

Some of the patients had required further periods of in-patient treatments but

had become stable again. The physicians emphasized the good overall results obtained under general-hospital conditions "in a disease which has been generally regarded as of such poor long-term prognosis for so many patients."

Treatment after 1956 consisted mainly of large doses of chlorpromazine, a sedative, combined with electronic convulsive therapy (E.C.T.). The use of insulin coma was rarely required, being used only when other treatments proved unsuccessful.

The atmosphere of hope given to the patient who gets treatment in a general instead of a psychiatric hospital may have been partly responsible for the successful outcome of the test, the physicians said. Also, the group was made up of selected rather than random patients.

• Science News Letter, 80:54 July 22, 1961

NUTRITION

Vegetable Use Increases

► A MARKED INCREASE in the use of green and yellow vegetables, tomatoes and citrus fruits has occurred during the last 50 years in the United States.

There also has been an increase in the use of dairy products, especially over the past 20 years, the International Congress of Dietetics meeting in London was told by Dr. E. Neige Todhunter of the University of Alabama.

"Over the last 50 years there has been little change in the consumption of meat, fish and poultry," Dr. Todhunter said. There has been a steady decrease in the

use of grains and potatoes, a slight increase in fats and oils, and an increase in sugars and sirups.

Today's food patterns in the U.S. retain a dominance of the early foods of the new land, but these have been modified and blended with the patterns of scores of nationalities that immigrated to the U.S.

Early settlers 350 years ago nearly starved until they learned from the Indians how to grow and use maize, or Indian corn. At first wheat did not thrive in the low land, and corn became the mainstay as breadstuff.

The North American continent gave nu-

merous new foods to the world, among them: turkey and cranberries, white potatoes (from South America and brought back across the Atlantic many years later), sweet potatoes, squash, sweet peppers, tomatoes, green beans, berries of many kinds, cocoa and chocolate, vanilla (from Mexico, and re-introduced by Thomas Jefferson via Paris), peanuts, pineapple, pecans and black walnuts.

• Science News Letter, 80:54 July 22, 1961

MEDICINE

Achilles Tendon Heals Itself Spontaneously

► THE ACHILLES HEEL may be vulnerable, but it is virtually impossible to keep the Achilles tendon from healing, Mayo Clinic studies, Rochester, Minn., have shown. On the other hand, it is virtually impossible to get a flexor tendon to heal, once it is cut.

Drs. Paul R. Lipscomb and Khalil G. Wakim of the Mayo Clinic said much work needs to be done to explain the difference in healing powers of different tendons, the connections between bone and muscle.

The scientists said their studies with rats attempted to establish the factors accounting for the extreme differences in the healing of the two types of tendons—the extensors, which unbend joints, and flexors, which bend joints.

In young children, as well as in rats, the Achilles tendon, or *tendo achillis*, heals spontaneously after surgical cutting. Also, cutting of the tendons of the extensors of the toes is followed in many patients by spontaneous healing and reestablishment of the normal continuity of the tendon.

On the contrary, the physicians reported in the current Proceedings of the Staff Meetings of the Mayo Clinic, "no one to our knowledge has reported such reconstruction or even spontaneous normal repair after severance of a flexor tendon in the synovial sheath (sheath containing the viscid fluid of joint cavities and tendons)."

• Science News Letter, 80:54 July 22, 1961

NUTRITION

Tooth Decay Found Low in Ethiopia

► THE OCCURRENCE of tooth decay is very low in Ethiopia, a survey has shown. When dental caries is present, however, it usually progresses to the destruction of the involved tooth.

The over-all nutrition of the Ethiopian is somewhat lower than that required for their level of activity, Dr. Arnold E. Schaefer of the Interdepartmental Committee of Nutrition for National Defense, National Institutes of Health, Bethesda, Md., told the International Congress of Dietetics in London.

Cases of kwashiorkor (nutritional disease caused by a maize diet), along with marasmus (a wasting disease), edema (swelling caused by excess fluid in the body) and growth retardation were evidence for protein malnutrition.

• Science News Letter, 80:54 July 22, 1961

EDUCATION

Education Costs High

The National Science Foundation believes \$50 billion must be spent on science education in the next ten years. Then doctor' degrees in science and engineering would double.

► THE NATIONAL Science Foundation has slapped a \$50 billion price tag on this country's ideal rate of top-quality scientific growth during the next decade.

If the Foundation has its way, 1970 will find the United States spending nearly triple the amount it now spends annually for science training, engineering training and basic research at colleges and universities.

Progressive annual cost rises would bring the annual tab of \$8.2 billion by fiscal 1970, compared with the \$3 billion acquired from all sources and spent in fiscal 1961.

The number of graduates getting doctor's degrees in science and engineering would double by 1970. There were 6,600 in 1960.

The Government's share of the burden was not forecast. NSF officials explained that since no figures are yet available on how much the Government spends for science education alone, no ten-year projection was possible. The Government, however, footed two-thirds of the \$900,000,000 bill for basic research in the fiscal year that ended June 30.

The long-range goal "is not going to happen unless we make a very determined effort to carry it out," said Dr. Richard Bolt, the Foundation's associate director for research. Unless the funds are forthcoming, "either the numbers (of trained United States scientists) will drop, or the quality will drop, or both. . . . We must find a way of staying and keeping ahead."

Not mentioned in the Foundation's newly published report, "Investing in Scientific Progress," is the scientific rivalry between the U.S. and the Soviet Union. But NSF spokesmen said their belief is that if the

U.S. advances at the proper rate, it will automatically regain world eminence and be "ready to meet all contenders," including Russia and an "exploding" China.

Also stressed was the Foundation's thesis that their report is not an attempt to induce more persons to become scientists. The idea is to encourage existing trends and make sure that training facilities are available for the predicted reservoir of interested talent.

About 645,000 college students are now enrolled for science and engineering degrees. The probable 1970 total is 1,130,000.

The key sentence in the report, said Dr. Bolt, is this: "Every young person who shows the desire and the capacity to become a scientist should be ensured the opportunity to do so."

A major point made is that while U.S. population will increase by 20,000,000 in the next ten years, total world population is expected to grow by 420,000,000. Since the U.S. cannot compete in terms of sheer numbers of new scientists, the emphasis must be on quality training within population limitations.

Fulfilling our science potential can be done without draining top talent from other professions, the Foundation believes. There is enough talent to meet all expected demands. The percentage of young people graduated from college has been doubling every 18 years. This trend is expected to continue for some time.

To keep the science and engineering population growing in both quality and numbers, laboratories, equipments and teaching staffs must be greatly expanded.

Professional staffs at colleges and uni-

versities should grow from the present 100,000 to 175,000 by 1970, with salaries increasing from \$800,000,000 to \$2.1 billion. Investments in staff facilities should go from \$150,000,000 to \$350,000,000.

Dr. Bolt said the report was a first try at an "overall quantitative interpretation" of the cost of needed science education, is "aimed at a very wide audience," and will serve as "a framework for continuing studies."

In a letter to Dr. Alan T. Waterman, NSF director, President Kennedy said the report "makes a valuable contribution in helping to relate the nation's requirements for the support of scientific research and education to our intellectual potential."

Copies of "Investing in Scientific Progress" can be obtained without charge from the National Science Foundation, 1951 Constitution Avenue, N.W., Washington 25, D.C.

• Science News Letter, 80:55 July 22, 1961



BULB-SHAPED BOW

ENGINEERING

Ship Design From Japan Helps Lessen Bow Wave

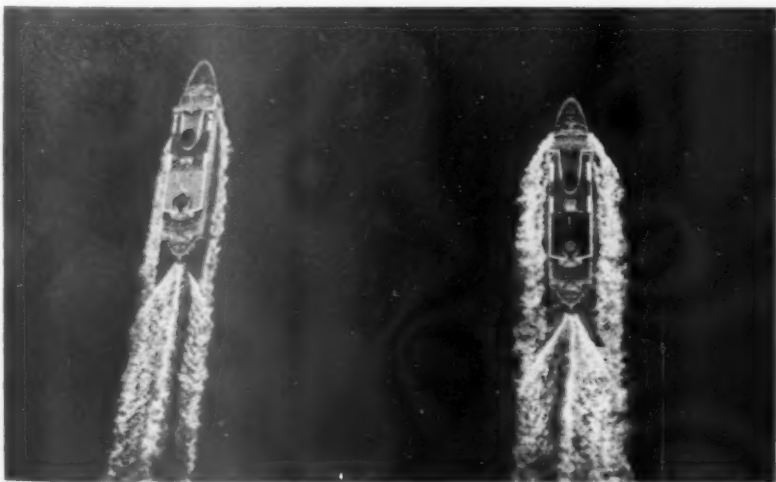
► A BOW DESIGN that considerably reduces the wave created when a ship cuts through the water has been developed.

Prof. Takao Inui of Tokyo University has designed a bulb-shaped bow that lessens the bow waves, increasing the speed and efficiency of a ship. The bow wave interferes with the ship's movement by becoming entangled in the ship's wake.

During test runs in Osaka Bay, a big bow wave rolled from a conventionally designed ship, while a smaller wave was produced from a ship with the bulb-shaped bow. Both ships were traveling at the same speed during that time.

Dome-shaped bows have been tried on ships before, but tend to hamper a ship in rough weather. The Japanese "wave suppressor," nearly ten feet long, is much larger than most previously used.

• Science News Letter, 80:55 July 22, 1961



JAPANESE BOW DESIGN CUTS WAVE

INVENTION

Lone Inventor Still Rates High in United States

► THE LONE inventor working away in a cellar or workshop is still an important cog in United States economic growth.

Despite the sky-rocketing growth of research work in Federal, industrial and private research laboratories during the last 20 years, the solitary inventor still manages to earn nearly 40% of all the patents issued. This percentage has remained relatively stable since 1936, a U.S. Patent Office study showed.

This smashes the common notion "that the lone inventor is being exterminated by the 'captive'—the research laboratory employee," experts at the George Washington University's Patent, Trademark and Copyright Foundation disclosed.

"More than half the inventions patented in the United States are used some time before the patents expire," the survey also noted. Previous estimates ranged from a meager 1% to 18%, with 5% most commonly used.

A random sampling of all patents issued in 1938, 1948 and 1952 and a questionnaire sent to the patent owners were used to compile the figures.

Between 55% and 65% of all assigned patents had been in production to some extent and at some time.

• Science News Letter, 80:56 July 22, 1961

PUBLIC HEALTH

Many Ills From Sunburn, Vacationers Are Warned

► SUNBURN IS NO JOKE. The lily-white red-haired secretary who takes off blithely for the beach on her summer vacation had better take her sunlight gradually, even on cloudy days.

Overexposure to sunlight can cause not only sunburn but a large family of diseases of the skin, including skin cancer, premature aging of the skin, and a group of light-sensitive and light-caused ailments.

In severe cases of sunburn, chills, fever and prostration may occur.

There is a high incidence of skin cancer and other diseases in Texas caused by overexposure to sunlight.

One method of protecting the skin uses the drug, 8-methoxypsoralen (8-MOP), which in capsule form can be taken by mouth before exposure to the sun. Much research has been done on this derivative of the Egyptian weed, *Ammi majus*. Although it promotes tanning by a photodynamic action, there are some inherent drawbacks in its use.

First, the skin not only tans more readily but sunburns more easily. Extreme care must be taken in using such products, both by mouth and applied on the skin, to avoid the sunburn reaction.

Second, on discontinuing the drugs, the melanin (dark pigment) concentration in the skin will decline. Therefore, the drugs must be administered again at regular intervals. There also may be unpleasant, or even toxic, side effects.

But the value of sunlight taken in moderation cannot be discounted. The vitamin D it provides in the body prevents rickets in children.

Sunlight's contribution to the well-being of all ages has been accepted. Although this reaction may be largely psychological, there is a possibility that sunlight-induced, biochemical alterations may also be somehow involved.

Psychological or physical in its benefits, sunshine is going to be embraced by some millions of Americans in the next weeks before Labor Day. To avoid a painful sunburn, spend only 10 to 15 minutes in the direct rays of the sun at first.

Plain vanishing cream, containing 10% para-aminobenzoic acid, gives 30 times as much protection as many commercial suntan products, Dr. William Becker Jr. of the University of Illinois has reported.

• Science News Letter, 80:56 July 22, 1961

MEDICINE

Gluten-free Diet Treats Nontropical Sprue

► NONTROPICAL SPRUE, which appears to be an inherited disease causing digestive disturbance, has been alleviated in 27 of 29 patients treated in New York, by a gluten-free diet.

The characteristic diarrhea, abdominal distention and weakness stopped and the patients' appetite returned within days to six weeks, Dr. Marvin H. Sleisenger of New York Hospital-Cornell Medical Center, New York, reported in *The New England Journal of Medicine*, 265:49, 1961.

One patient, ill from the age of 15 months to 23 years when she was treated at the New York Hospital, had allergies to rye, barley, oats, chocolate and spinach. She remained well for two and a half years on the gluten-free diet and became the mother of twins.

Dr. Sleisenger and his colleagues have worked for seven years with the 29 patients, some of whom had shown symptoms of sprue for 35 years. Although gluten-free diet has been reported helpful by other investigators, clinical and metabolic studies reported by Dr. Sleisenger throw further light on the syndrome.

He said an enzyme deficiency appears to affect the intestinal lining, absorptive mechanism and protein metabolism, but further study is necessary to explain exactly how this happens.

A palatable gluten-free bread was developed at the University of Toronto, Canada, as early as 1955, but so far it is not available in this country, according to dietetic authorities.

On Feb. 18, 1955, SCIENCE SERVICE reported that Miss Betty Upton of Toronto had developed a gluten-free bread that could be included in the diet of sprue patients. She used potato flour, egg white, tetrasodium pyrophosphate, calcium lactate, finely ground bran, cream of tartar, salt and sugar. Previous efforts at making gluten-free bread, Miss Upton said, had failed because baking powder was used in large quantities and a metallic taste resulted.

• Science News Letter, 80:56 July 22, 1961

IN SCIENCE

TECHNOLOGY

Vast Files Searched Fast In Electronic "Library"

► AN ELECTRONIC "library" capable of pinpointing and delivering one printed page from among millions in a matter of seconds has been demonstrated.

The new WALNUT system, developed by International Business Machines Corporation, transfers a tiny image of the needed document to an IBM card. A full-sized copy can be viewed on a screen or printed without removing the document from the files.

The prototype system, built by the IBM Advanced Systems Development Division, San Jose, Calif., will be used by the Central Intelligence Agency. There are no plans for commercial marketing.

Filed documents are photographed and reduced to about one-thousandth their original size. They are transferred to film strips, each holding 99 images. At the same time, control cards record the file location. Each storage bin holds a total of 990,000 images. With at least 100 files, the equivalent of a library of more than 300,000 books can thus be contained in a space the size of a standard office desk.

Since the original image never leaves the file, there is no chance of its being misfiled or removed.

Similar image retrieval systems, IBM officials believe, would be valuable for storing scientific periodicals, engineering drawings, legal documents, patent records, drivers' license records, medical case histories and real estate titles.

• Science News Letter, 80:56 July 22, 1961

ASTRONOMY

Jupiter's Dark Band Is Shadow of Comet Halo

► A RING OF COMETS and meteorites probably circles around the planet Jupiter, a Russian scientist reports.

A dark band girdling Jupiter at its equator is actually the shadow cast by the huge halo, Dr. S. K. Vsekhsvyatskiy, astronomer at Kiev State University in Russia, emphasizes. The "shadow" shifts position as the planet rotates around the sun in a manner expected for a shadow, Dr. Vsekhsvyatskiy notes.

The ring of comets and meteorites supposedly formed many millions of years ago when an explosion on Jupiter sent huge masses of rock hurtling into space. The tremendous pull of the large planet's gravity trapped the rock pieces into orbiting around Jupiter in a ring-like mass, the Russian scientist reports in a translation by the U.S. Joint Publications Research Service, Washington, D. C.

• Science News Letter, 80:56 July 22, 1961

THE FIELDS

ENTOMOLOGY

Bait for Termite Trap Found in Decaying Wood

▶ A BAIT that attracts termites as much as cheese attracts mice has been isolated from rotting wood. The bait will be useful in controlling these destructive nibblers, which do hundreds of millions of dollars of damage each year in the United States alone.

The bait, in relatively pure form a colorless oil, is a more or less natural lure because it is extracted from the termites' usual food—wood that is decaying from infestation with fungi. Certain of these fungi or their products help form powerful attractants that guide the termites to an edible piece of wood.

Drs. G. R. Esenther, T. C. Allen, J. C. Casida and R. D. Shenefelt of the University of Wisconsin and the U.S. Department of Agriculture Forest Service, both in Madison, Wis., tested the attracting powers of several kinds of fungi and found that neither healthy wood alone nor fungus alone attracted the termites.

In combination, however, wood and fungus made a very good lure.

The most powerful attractant was produced in pine wood infected with the brown rot fungus, *Lenzites trabea*. All three kinds of termites tested preferred the wood decayed by this particular fungus, and within two minutes most of them had clustered around the wood parts where fungus growth was mature or "woolly." Extracts of this part of the wood attracted the insects even faster than the whole wood. Every termite in a test box gathered around a pad containing the extract within 30 seconds.

This response occurred despite the fact that the termites were in the light and exposed to dehydration, the scientists report in *Science*, 134:50, 1961.

• *Science News Letter*, 80:57 July 22, 1961

GENERAL SCIENCE

Colleges Buy Own Tools, But U.S. Pays for Work

▶ COLLEGES and universities doing scientific research buy most of their own equipment and foot the bulk of the bill for building new laboratories or remodeling old ones.

It is Federal money, however, that makes up the major share of the far larger bill for the actual research work.

These are the chief findings in a National Science Foundation survey of research and development costs at the college level in fiscal 1958, latest year for which figures have been gathered and processed.

The 253 independent institutions of higher learning reporting on capital outlays for research facilities and other items in the natural and social sciences spent

\$153,539,000. The Government's share was \$41,361,000 or about one-fourth.

Operating expenditures for budgeted research and development during the same year totaled about \$740,700,000. Federal support accounted for 73% of this, or about \$540,700,000.

The Foundation notes: "It may be seen that the role of the Federal Government in the support of research and development was reversed from that of support of capital items for this work."

The \$112,178,000 in non-Federal sources for facilities and equipment came from the institutions' own funds, State appropriations or private endowments. Federal support was largely confined to research centers administered for the Government, such as the University of Chicago's Argonne National Laboratories, which got \$26,000,000.

Some 50% of the total capital expenditures went to the life sciences, reflecting "the need for costly medical school facilities," the Foundation said. The physical sciences received 33%, engineering 15% and the social sciences three percent.

The report, No. 28 in a Foundation series on "Reviews of Data on Research and Development," is available for five cents from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C.

• *Science News Letter*, 80:57 July 22, 1961

ARCHAEOLOGY

Old Hungarian Church To Be Kept in Glass Case

▶ AN ANCIENT CHURCH in Hungary will be preserved for posterity in a glass case.

The church, located at the village Zsambek some 20 miles from Budapest and now in ruins, will be restored in two stages. First the stones scattered around the church will be put back into place and loose stones will be secured. Then the entire nave, along which the stone walls are missing, will be cased in glass.

The glass covering will be supported by a light metal framework and will help prevent further damage to the church.

The idea for the glass support originated with Prof. Frigyes Pogany of the Budapest Technical University. Many colleges from the University are supporting the restoration project, it is reported by the Director of the Royal Geographical Society, Lawrence Kirwan, in *Antiquity*, 35:58, 1961.

Mr. Kirwan reports that the church was built in 1258 and is considered a fine example of Romanesque-Gothic style. French art historians believe that Villard de Honne-court, a genius of 13th century architecture, helped build it.

The building was used as a fort by the Turks in the 16th century. Its ruin is believed to date from 1581 when the Hungarians tried to take it back from the Turks.

Since then, local builders have helped themselves to stones for building purposes. It is believed that all the stones missing in the church are now built into the houses in the village.

• *Science News Letter*, 80:57 July 22, 1961

BIOCHEMISTRY

Virus Particles Line Up At a Certain Stage

▶ AT A CERTAIN STAGE of growth within a cell, the particles of at least one type of virus line up in neat columns. A research team at Columbia University's College of Physicians and Surgeons studied the growth of type nine ECHO virus, which causes a grippe-like disease in man, in kidney cells from the rhesus monkey. They found that the virus particles arrange themselves along parallel filaments within the cytoplasm of the cell.

In photographs taken with an electron microscope, this alignment makes it appear that small patches of window screen are scattered about the cell, except that the holes of the screen are solid (the virus particles) and the wire spaces are blank.

Some of the solid spots are very dark. These are the complete particles. Other spots are lighter in color and these are incomplete particles, Drs. Richard A. Rifkind, Gabriel C. Godman, Calderon Howe, Councilman Morgan and Harry M. Rose report in the *Journal of Experimental Medicine*, 114:1, 1961.

Cut in cross section and magnified 258,000 times, the particle arrangement is hexagonal. Although the pattern is often somewhat askew, each particle is surrounded by six others and membranes can be seen.

The particle arrangements seem to accumulate around particular granular masses in the cell at one stage of growth and then move out to the edge. Finally the particles escape through tears in the cell membrane and the cell may disintegrate.

The intact cell seems to serve as a protective incubator for the virus particles. The incomplete particles become numerous during advanced stages of infection, but they are never found outside the cell. Such evidence indicates that the incomplete particle is unstable.

• *Science News Letter*, 80:57 July 22, 1961

TECHNOLOGY

Irradiated Plastics Become Semiconductors

▶ IRRADIATION of chlorinated plastics with ultraviolet light converts them into semiconductors, the materials from which transistors and related electronic items are made.

This discovery is reported in *Nature*, 191:164, 1961, by Gerald Oster, Gisela K. Oster and Marian Kryszewski of the Polytechnic Institute of Brooklyn, N. Y. They used the chlorinated plastic, saran, for their experiments. Ultraviolet light is in the invisible range with wavelengths shorter than visible light.

They found that at the border of irradiated regions unique p-n junctions occurred as in other semiconductors. The irradiated samples also showed photoconductivity in that they conducted an electric current when exposed to light. The photoconductivity appears to be due to trapped, unpaired electrons.

• *Science News Letter*, 80:57 July 22, 1961

ASTRONOMY

Jupiter, Saturn Shine in August

The planet Jupiter is the brightest object in the sky next to the moon during August. Saturn is as bright as a first magnitude star, James Stokley reports.

► **TWO BRIGHT PLANETS**—Jupiter and Saturn—have joined with the stars normally visible at this time of year to make the evening skies of August especially brilliant.

Both planets, and the stars as well, are shown on the accompanying maps. These depict the skies as they appear about ten p.m. your own kind of standard time (add one hour for daylight saving time) at the first of August, an hour earlier at the middle of the month and two hours earlier as the month comes to an end.

Jupiter has a magnitude of minus 2.3, on the scale used by astronomers for rating the brilliance of celestial objects. Thus is far brighter than any other object in the evening sky except the moon, so Jupiter is easy to identify. It has been in the constellation of Capricornus, the horned goat, but in August moves next door into Sagittarius, the archer, in the southern sky.

About five degrees to the west (right) is Saturn. Its magnitude is plus 0.4 so it ranks with the first-magnitude stars; however, it is about a twelfth as bright as Jupiter. Both of these planets are visible as soon as it gets dark, and remain in view until shortly before sunrise.

The stars in Sagittarius outline a teapot. The handle is toward Saturn, and the spout to the right, toward the next constellation of Scorpius, the scorpion. In the left-hand end of this group, the stars are in a curved line, which forms the scorpion's tail. That is the way the figure was pictured in the old star maps. The modern astronomer, of course, ignores these picturesque old figures, of lions, bears and dogs as well as scorpions.

At the center of the scorpion is a bright star, red in color, called Antares, which is about half as bright as Saturn.

Looking higher in the southern sky, you can see two other stars of the first magnitude. Directly above Jupiter is Aquila, the eagle, with brilliant Altair. And still higher—virtually overhead, in fact—you find Vega, in Lyra, the lyre. Below this group, toward the east, is Cygnus, the swan, shown partly on the southern map, partly on the northern. It is on the latter that Deneb, the brightest star in Cygnus, is shown.

The big dipper, which is a part of Ursa Major, shines in the northwest. In it are the pointers, the two stars in the dipper's bowl that show the direction of Polaris, the pole star. Although of second magnitude, this is a well-known orb, because it always stands in about the same position in the north.

If you follow the handle of the dipper, and continue its curve to the left, it will bring you to another star of the first magnitude. This is Arcturus, in Bootes, the herdsman.

Stay up late on August nights and you may see another planet, for Venus rises in the east about three hours before the sun. Its magnitude is now about minus 3.5 which makes it about three times as bright as Jupiter. Venus, Jupiter and Saturn are the only planets now visible; the other two that are sometimes visible without a telescope, Mercury and Mars, are too nearly in the sun's direction to be seen.

From about the middle of August to the end, the moon will shine in the sky during evening hours. On Friday, Aug. 25, it will be full, rising in the east as the sun is setting in the west.

During that night the moon will pass through the shadow of earth, producing a lunar eclipse. At 10:09 p.m., EST, the eclipse will be at its height. It will not be quite totally eclipsed as a narrow sliver of the moon's surface will remain illuminated by the direct rays of the sun.

The shadow of our planet actually has two parts. That shown is the inner part, the umbra, where the globe would completely hide the sun. But around it is a larger region, called the penumbra, where the sun is only partly hidden. At 7:37 p.m. EST the moon starts to enter the penumbra. In the western part of the United States, of course, the moon will not have risen when this happens.

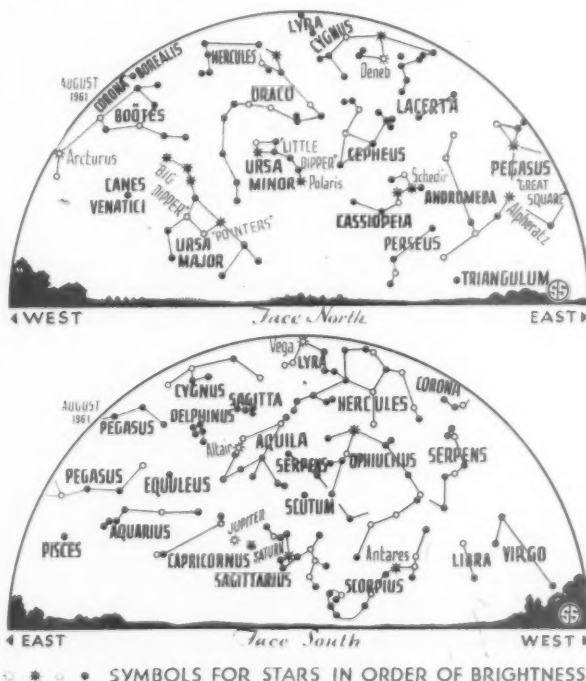
But even in the east, where the moon will be in the sky, nothing will be seen until later when the eastern edge of the lunar disc may seem to be a little fainter than normal.

At 8:36 p.m. EST the moon starts to enter the umbra, or earth's shadow, and the eclipse really begins. Very soon afterwards there will be a noticeable dimming of the eastern edge of the disc. The darkened portion will gradually increase until the maximum eclipse at 10:09 when more than 99% of the lunar diameter will be in shadow. Then the shaded area will become smaller until at 11:42 p.m., the moon will be completely out of the umbra. As the eclipse comes to an end, the moon will have risen even on the Pacific coast, and the eclipse will be visible throughout all of North America except the northwestern tip of Alaska.

Even when immersed almost completely in the earth's shadow, the moon will still be visible, shining with a dull, coppery-red glow. This is an effect of the earth's atmosphere, which acts as a prism to bend sunlight around into the shadow. As the rays pass through the air above our heads, some of the blue light is scattered, and this is what gives the daytime sky its blue color.

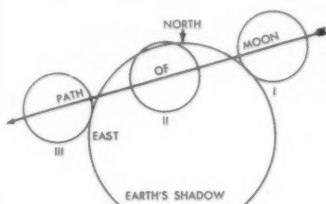
White light consists of a mixture of several colors—red, orange, yellow, green, blue and violet. With the blue and other colors at that end of the spectrum reduced, red predominates, and so the light that is bent into the shadow is much more red than ordinary sunlight.

The lunar eclipse on Aug. 25 is not the



only one for this month. Two weeks earlier, at the time of new moon, that body will come between the earth and the sun, producing a partial solar eclipse. To see it, you will have to be in southern Africa, along the coast of Brazil, in the South Atlantic or Antarctica. Over that general area, the moon will partially hide the sun. Along a belt that is mostly over the ocean there will be what is called an annular eclipse. Around the dark disc of the moon a ring of the sun's surface will be visible.

This happens because the moon will then be at about its greatest distance from the earth and its size, as we see it in the sky, will not be enough to cover the solar disc. A total eclipse of the sun occurs when the moon is closer. Then it covers the sun completely and the sun's outer envelope, the corona, flashes into view.



Partial Eclipse of Moon Aug. 25, 1961

The large circle represents the shadow of the earth, and the small circles—I, II and III—indicate the successive positions of the moon as it passes through the shadow. The three phases shown occur at the following times (all p.m.):

	EST	CST	MST	PST
I Moon starts into shadow	8:36	7:36	6:36	5:36
II Middle of eclipse	10:09	9:09	8:09	7:09
III Moon leaves shadow	11:42	10:42	9:42	8:42

Celestial Time Table for August

Aug.	EST	
3	6:48 a.m.	Moon in last quarter
7	1:00 p.m.	Moon passes Venus
11	5:36 a.m.	New moon, annular eclipse of sun
	noon	Moon farthest, distance 252,600 miles
12	early a.m.	Meteor shower visible, apparently radiating from constellation of Perseus in northeastern sky
19	5:52 a.m.	Moon in first quarter
23	10:00 a.m.	Moon passes Saturn
	6:00 p.m.	Moon passes Jupiter
25	2:00 p.m.	Moon nearest, distance 222,000 miles
	10:14 p.m.	Full moon, Lunar eclipse

Subtract one hour for CST, two hours for MST, and three hours for PST.

Know the Sky

These star maps showing the positions of stars and planets can help you locate satellites when they flash briefly across the sky. Familiarity with the constellations and their relative positions makes locating artificial moons much easier whenever they are visible from your area.

• Science News Letter, 80:58 July 22, 1961

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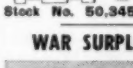
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• Books of the Week •

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ADVANCES IN MORPHOGENESIS, Vol. I—M. Abercrombie and Jean Brachet, Eds.—Academic, 445 p., illus., \$12.50. Intended to link up the various branches of biology that deal with development, such as research on the embryology of ascidians, on regeneration of vertebrate appendages, and on limb morphogenesis.

ADVANCES IN X-RAY ANALYSIS, Vol. 4—William M. Mueller, Ed.—Plenum Press, 568 p., illus., \$15. Proceedings of the Ninth Annual Conference on Application of X-Ray Analysis, held August 10-12, 1960, in Denver, Colo.

BASIC MATHEMATICS, Vol. 2—Norman H. Crowhurst—Rider, J. F., 138 p., illus., paper, \$3.90. Uses "pictured-text" techniques to introduce algebra, geometry and trigonometry as ways of thinking in mathematics.

BIRD STUDY—Andrew J. Berger—Wiley, 389 p., illus., \$9. One-semester course in ornithology for liberal arts students. Emphasis is on the living bird and primarily on North American birds.

GENETIC PERSPECTIVES IN DISEASE RESISTANCE AND SUSCEPTIBILITY—Richard H. Osborne, Ed., intro. by Henry A. Wallace—N. Y. Acad. of Sciences, Annals, Vol. 91. Art. 3, 225 p., illus., paper, \$4.50. On adaptation in man and animals, on genetic errors of metabolism, and on genetic resistance and susceptibility to infectious disease.

GUATEMALA: The Land and the People—Nathan L. Whetten—Yale Univ. Press, 399 p., illus., \$6. Comprehensive study of Guatemala's rural population, its institutions, economy, problems and outlook.

A GUIDE TO TECHNICAL LITERATURE PRODUCTION: A Concise Handbook of Production Methods—Emerson Clarke—TW Publishers, 192 p., illus., paper, \$3. Training course discussing the elements and organization of production and the technical writer's job.

A HANDBOOK OF EMOTIONAL ILLNESS AND TREATMENT: A Contemporary Guide with Case Histories—Richard C. Robertello, M.D.—Argonaut Bks., 159 p., \$3.95. Intended to enable the reader to obtain a better understanding of himself and others.

HANDBOOK OF THERMOPHYSICAL PROPERTIES OF SOLID MATERIALS, Vol. I: Elements (Melting Temperature above 1000°F)—Alexander Goldsmith, Thomas E. Waterman and Harry J. Hirschhorn—Pergamon, rev. ed., 758 p., in loose-leaf binder, vols. 2-5 June/August, \$90 per set. Each volume designed to be expandable for inclusion of additional or revised data sheets.

IN VITRO AND IN VIVO EFFECTS OF AMINE BUFFERS—Gabriel G. Nahas, Ed.—N. Y. Acad. of Sciences, Annals, Vol. 92. Art. 2, 479 p., illus., paper, \$4.50. Series of papers resulting from a conference held by the Academy in December 1960.

KNOW ABOUT HORSES: A Ready Reference Guide to Horses, Horse People and Horse Sports—Henry Disston—Devin-Adair, 216 p., illus., by Jean Bowman, \$6.95. Acquaints the interested reader with a wide variety of terms and facts about horses.

PLASMAS AND CONTROLLED FUSION—David J. Rose and Melville Clark, Jr.—Wiley, 493 p., illus., \$10.75. Text on the principles underlying plasma physics, for graduate students in the physical sciences and engineering fields.

PROBLEMS IN QUANTUM MECHANICS—I. I. Goldman and V. D. Krivchenkov; ed. by B. T. Geilikman, transl. from Russian by E. Marquit and E. Lepa—Addison-Wesley, rev. ed., 275 p., \$8.50. Problems, answers and solutions, designed for use with Landau-Lifschitz quantum mechanics nonrelativistic theory.

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PROCEEDINGS OF A CONFERENCE ON RESULTS OF THE FIRST U. S. MANNED SUBORBITAL FLIGHT—Intro. by Hugh L. Dryden and Lloyd V. Berkner—GPO, 76 p., illus., paper, 50¢. Papers of 1961 Conference of NASA with National Institutes of Health and National Academy of Sciences.

THE SCIENCE OF GENETICS—Charlotte Auerbach—Harper, 273 p., illus., by Inge G. Auerbach Linker, \$5.95. Written by geneticist for general reader to provide the indispensable knowledge without which the most recent advances in genetics cannot be understood.

THE SCIENTIFIC APPROACH TO CAREER PLANNING—M. C. Cobb, foreword by David A. Shepard—Lantern Press, 142 p., \$3.95. Shows how the process of inductive inference (result of scientific observation, experiment and reasoning) can be applied to the subject of career planning.

TAKE A NUMBER: New Ideas + Imagination—More Fun—Jeanne Bendick and Marcia Levin—Whittlesey House, 63 p., illus., by J. Bendick, \$2.50. Amusingly presented, shows grade school youngsters some of the innumerable uses for number concepts and numeration.

TEACH YOURSELF BOTANY—John H. Elliott—Roy Publ., 214 p., illus., \$2.75. Brief outline of the scope of the science known as botany.

TEACH YOURSELF METEOROLOGY—"Aeolus"—Roy Publ., 2nd ed., 167 p., illus., \$2.75. Little book explaining the behavior of the atmosphere without mathematics and outlining principles by which one can predict this behavior from observations.

THE TORCH LIGHTERS: Tomorrow's Teachers of Reading—Mary C. Austin, Dir.; foreword by Francis Keppel—Harvard Univ. Grad. School of Educ. (Harvard Univ. Press), 191 p., paper, \$1. This Harvard-Carnegie field study reports on current college preparation of teachers of reading and suggests recommendations for improvement.

TRACE ELEMENTS IN PLANTS—Walter Stiles—Cambridge Univ. Press, 3rd ed., 249 p., photographs, \$7.50. Emphasis in this updated edition is on trace elements in plants and the effects of their deficiency or excess on grazing animals. Also refers to soil conditions as they relate to availability of trace elements.

TRANSISTORS AND ACTIVE CIRCUITS—John G. Linvill and James F. Gibbons—McGraw, 515 p., \$14.50. Discusses fundamental problems encountered in active circuits, the physics of semiconductor, two-port network theory, and transistor circuits.

U.S.S.R. LITERATURE ON AIR POLLUTION AND RELATED OCCUPATIONAL DISEASES, Vol. V—B. S. Levine—USPHS (OTS), 219 p., illus., paper, \$3.50. Latest survey of Russian literature dealing with air pollution aspects of industrial and public health problems.

WATER TREATMENT FOR INDUSTRIAL AND OTHER USES—Eskel Nordell—Reinhold, 2nd ed., 598 p., illus., \$12. Practical reference work, brought up-to-date to include latest developments in the technology of water treatment and their application.

WEATHER MODIFICATION: Second Annual Report for Fiscal Year Ended June 30, 1960—National Science Foundation—GPO, 22 p., photographs, paper, 15¢. Research highlights and weather modification activities.

WORLD AIRCRAFT ILLUSTRATED—John W. Underwood, Ed.—Aero Publ., 239 p., photographs, \$8.50. Compiles data on most of the current aircraft in production.

WRITING A TECHNICAL PAPER—Donald H. Menzel, Howard Mumford Jones and Lyle G. Boyd—McGraw, 132 p., illus., \$3.25. Short and lively practical guide written by experts, to help the scientist, the technician, the advanced student, and the technical writer reporting.

• Science News Letter, 80:60 July 22, 1961

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CONSERVATION

Fight Drought Damages

► **DRASTIC DAMAGES** resulting from the drought currently hitting the northern Great Plains can be greatly reduced by long-range conservation measures.

Prolonged dry periods, dust storms, and hordes of hungry grasshoppers have been part of the Great Plains even before man set foot on the sandy soil, but improper use of the land has aggravated the problems. Such conservation programs as planting grass to anchor down sandy soil and better management of cultivated land are needed to fight the damaging effects of droughts.

Millions of acres of sandy soil unsuitable for year-to-year cultivation are currently being used by Great Plains farmers for planting wheat. During long dry periods the fields become "dust bowls" with deep erosion scars and dust storms dotting the area.

Soil conservationists have already made a big step forward in this direction when the Great Plains Soil Conservation Program was created in 1956. U.S. Department of Agriculture soil conservation experts work closely with Great Plains farmers in planning the proper use of each farm's acreage. Part of the cost is shared by the Government.

"More than 17,000,000 acres of farmland now come under this long-range plan," Cyril Luker, director of the program, told SCIENCE SERVICE. "Although you cannot blame the droughts on the people, its effects can be lessened by proper land management," the soil conservationist said.

No immediate relief is expected from the drought now embracing much of the Northern Great Plains and parts of Canada. Weather Bureau records dating back from last September show unusually high temperatures and little precipitation in a belt covering the Northern Great Plains states and parts of Wyoming, Montana and Minnesota.

"Some areas have witnessed the driest spring since the turn of the century," Wayne Palmer, Weather Bureau meteorologist, said. The average June temperature in one hard-hit area was the highest recorded in the last 70 years. June is considered about the most important month during the wheat growing season.

If the present trend continues, the Northern Great Plains may become another "Dust Bowl of the Thirties."

• Science News Letter, 80:61 July 22, 1961

PHARMACOLOGY

AMA Report on Drugs

► **TIMED FOR** distribution to doctors while Senate drug hearings make headlines, the Journal of the American Medical Association published a special report on therapeutic drugs, the first in an annual series, 177:14, 1961.

The question of making drugs available for nonproprietary names is discussed by Dr. Lloyd C. Miller of New York, director of revision, U.S. Pharmacopeia. He urged that the generic, or nonproprietary names be "as short and pronounceable as possible."

The use of generic names for drugs, as required in a bill introduced by Sen. Estes Kefauver (D-Tenn.), was argued at a two-day Senate hearing on the bill. Proponents say that if doctors used generic names when prescribing drugs, the cost would be considerably reduced. Confusion would also be reduced.

Dr. Miller states that many drugs are known by four and often more than half a dozen different names, but that new laws are not needed to require use of only one name for a specific drug.

He urges the medical profession to "co-operate in the effort" to reduce confusion by using accepted nonproprietary names. No drug can be called by an official nonproprietary name until the agreed-upon name is published in U.S. Pharmacopeia.

Dr. Miller uses demethylchlortetracycline hydrochloride which is 12 syllables long, to illustrate the difficulty of shortening names. The last four syllables in the compound's name convey "indispensable information"

on the general nature of the drug, which is an antibiotic.

The AMA's Council on Drugs lists in the special report only 51 drugs evaluated by it during 1960. One of the leading drugs evaluated was griseofulvin, described as a "major breakthrough" in the treatment of superficial fungus infections. Caution in the use of this and other drugs was sounded:

"Although serious untoward reactions are infrequent," the report states, "griseofulvin is not innocuous; skin eruptions, leukopenia, allergic reaction, and headache are among the reported side effects. Thus, the drug should not be used indiscriminately, but should be reserved for use" only for certain conditions.

The AMA Council on Drugs now acts as a clearing-house for nonproprietary names. Proposals are received by the Council, and are checked against existing names. The Kefauver bill would leave the choice of drug names and their advertising to the Food and Drug Administration.

Dr. Miller suggests two plans that would improve the present system of listing generic names. First, he called for reaching an agreement within the pharmaceutical industry to use a system of code prefixes in identifying compounds during the period of laboratory and clinical trial.

The second change would call for similar industry agreement to select nonproprietary names, in cooperation with the Council on Drugs, for all new drugs before their introduction on the market, preferably at the

time new drug applications are filed with the Food and Drug Administration.

• Science News Letter, 80:61 July 22, 1961

TECHNOLOGY

Turbine Vanes Withstand Heat Oxidation

See Front Cover

► **TURBINE VANES** for J-75 jet engines are made from special materials that have been "chromallized," a patented method of diffusing chromium and other elements into steels, super-alloys and refractory metals to impart far greater resistance to oxidation at high operating temperatures. The vanes, shown on the cover of this week's SCIENCE NEWS LETTER, are being readied for shipment from the Chromalloy Corporation plant in West Nyack, N. Y.

• Science News Letter, 80:61 July 22, 1961

ENGINEERING

Fertilizer Blasts Salt, Saves Money

► **A NEW** blasting technique, utilizing ammonium nitrate mixed with fuel oil, is saving one company alone \$250,000 per year.

The use of this common fertilizer in the blasting mixture was reported by William C. Bleimeister and John L. Ryon Jr. of the International Salt Company in Clarks Summit, Pa.

The company mines at Detroit, Mich., Avery Island, La., and Retsof, N. Y., are now using this new technique and its use is planned in a new mine. The ammonium nitrate-fuel oil mixture is, pound for pound, as effective as dynamite.

• Science News Letter, 80:61 July 22, 1961

OCEANOGRAPHY

Landlocked Scientists Could Explore Oceans

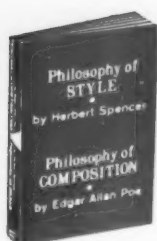
► **LANDLOCKED** scientists scattered in inland colleges and universities throughout the United States should be tapped to help explore the world's oceans.

A wealth of scientific talent existing in inland research institutions could be used to support actual oceanographic work on the high seas, Dr. Arthur E. Maxwell, head of the geophysics branch of the Office of Naval Research, Washington, D. C., reported. With the increasing interest in oceanography, more capable scientists are needed to bolster the relatively small ranks of oceanographers now probing the oceans.

Extremely valuable theoretical and experimental work can be conducted inland unhampered by such headaches attached to the operation of large fleets of research vessels. Dr. Maxwell noted that scientists studying wave motion on inland lakes have a problem similar to that on the oceans.

Some of these landlocked scientists could also actually participate in ocean-going expeditions of such widely-known coastal oceanographic institutions as Scripps on the Pacific and Woods Hole on the Atlantic.

• Science News Letter, 80:61 July 22, 1961



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NATIONAL GEOGRAPHIC MAGAZINES. 1888-1960, any issue. Periodical Service, Box 465-SN, Wilmington, Delaware.

INVENTION

Patents of the Week

A satellite communication system with little or no electronic equipment has been patented. A stereo-camera for surgeons and a mid-air warning system were also invented.

► A TROUBLE-SHOOTING satellite communication system designed for military and peaceful uses has been patented.

A cluster of balloon satellites whirling around the earth would be used to send and receive radio messages during military maneuvers, or take over in case the future broadcasting satellite network breaks down. Franz T. Geyling, Murray Hill, N. J., won patent No. 2,991,027 for the invention and assigned the rights to Bell Telephone Laboratories, Inc., New York.

A series of satellites in orbit, each orbit containing a group of satellites, would be located at altitudes up to several thousand miles, Mr. Geyling stated. Radio signals would be bounced off the balloon satellites as they passed overhead and picked up at a receiving station over the horizon.

The balloon satellite, made of Mylar plastic with a shiny metal coating, would be launched into orbit from a rocket. A trip switch would automatically inflate the balloon upon leaving the rocket.

The invention evolved from the work done by Bell Telephone Laboratories on the Echo project, Mr. Geyling stated. The 100-foot balloon satellite, Echo I, was launched on May 5, 1960, and is still orbiting around the earth.

The communication system is very inexpensive and highly reliable because the balloons have little or no electronic equipment, he reported. By finding orbits where the radiation damage to the device is small, the balloons could last for several years.

When a broadcasting or "electronic" satellite develops trouble in a particular region, that system could be quickly switched over to a balloon orbiting nearby.

A stereo-camera by which a surgeon can take accurate stereo photographs during a critical moment of surgical operation without disturbing the progress or continuity of his work was invented by Wilhelm Winzenburg, Dresden, Germany, who assigned rights of patent No. 2,990,765 to VEB Kamera-und Kinowerke Dresden. The three-dimensional photographs are valuable for medical students and for "later critical study by the surgeon himself," the patent stated.

The lightweight camera, which is strapped to the surgeon's head, is operated automatically and electrically by simply stepping on a switch. The invention supposedly eliminates the need for awkward movie or TV cameras that would hamper the performance of the surgeon during these critical times.

A warning system for preventing mid-air plane crashes was patented. Emory Lakatos, Santa Monica, Denny D. Pidhayny and Millard F. Gordon, Los Angeles, Calif., received patent No. 2,991,463 and awarded

the rights to Thompson Ramo Wooldridge, Inc., Cleveland, Ohio. Sound waves continuously given off by an airplane would trigger a warning signal telling a pilot whether to turn left or right if a collision is imminent. The system is "completely independent, requiring no ground equipment," the patent stated.

An anti-smog muffler that has a tube for bypassing the exhaust gases from the "cleaning system" until the system is warmed up was patented by William H. Claussen, Berkeley, Calif., who assigned rights of patent No. 2,991,160 to California Research Corporation, San Francisco. The bypass prevents water from condensing on a "catalytic converter" which would reduce the efficiency of the purifying system.

• Science News Letter, 80:62 July 22, 1961

NATURAL RESOURCES

Profit in Harvest Of Alaska Sea Lions

► AN EXPERIMENTAL HARVEST of Alaskan sea lions is seen paving the way for a promising new industry, the Department of the Interior reports.

Conducted to cut damage by sea lions to fishing gear and catches, the harvest yielded some 200 tons of high-protein ground meat, sold to fur farmers feeding mink. Demand from fur farms and fish hatcheries for additional meat reportedly is big.

There are an estimated 150,000 sea lions in Alaskan waters—enough to support commercial operations, if processing facilities can be improved. A commercial fishing company did the harvesting under contract with the Fish and Wildlife Service.

• Science News Letter, 80:62 July 22, 1961

Questions

ASTRONOMY—What is the latest value for the astronomical unit? p. 50.

EDUCATION—How much money was spent for basic research in the fiscal year ending June 30? p. 55.

Photographs: Cover, Chromalloy Corporation; p. 51, National Aeronautics and Space Administration; p. 53, Lockheed Missiles and Space Company; p. 55, Prof. Takao Inui; p. 64, Double "A" Brand.

GENERAL SCIENCE

News From Science Clubs

CONSTRUCTIVE new ideas for increasing the scope and effectiveness of local club activities continue to roll in. Here are some of the highlights from recent reports to Science Clubs of America:

THE BIOLOGY Club at the Shelby, Ohio, High School sees that its science displays get widespread attention by placing them at PTA meetings, school "open house" sessions, and community clubs.

THE BUG-O-NEERS at Danville, Pa., High School raise money by selling candy and Christmas trees. The most popular activities among club members include nature hikes and field trips to hospitals, greenhouses and museums in the area.

THE S.A.M. (for Science, Art and Mathematics) Club at St. Ambrose School, Anderson, Ind., has the pleasant chore of keeping a classroom science table filled with "interesting things." The club also is building a small science-mathematics library.

GARDEN SEEDS are sold in early spring by sixth graders in the Jefferson School Elementary Science Club at South Bend, Ind.

HIGH SCHOOL students in the West Rowan Science Club at Mt. Ulla, N. C., are helping foster scientific interests among the younger set by sponsoring a regional science fair for elementary schools.

THE SHOWING of science movies after school hours for all interested students at Rex Mundi High School, Evansville, Ind., is cited as one of the best received programs undertaken by the Rex Mundi Science Club.

WELL-ACCEPTED programs devised by the Junior Scientific Society at Monkton Combe School, Bath, England, include an "Open Day" for visiting parents each June, "lecturettes" by members, and lectures by advanced students who are former members.

POT-LUCK dinners preceding talks by guest speakers are proving popular with the Royal Researchers at San Marcos High School, Santa Barbara, Calif.

THE TRI-BETA Club at St. Edward High School, Elgin, Ill., conducts "assembly programs for the student body or visiting groups, aimed at increasing knowledge of, and interest in, science."

AT ELIZABETH, Pa., members of the Science Club at Elizabeth Forward High School are sponsoring a community conservation program. They have obtained and distributed 200 Scotch pine seedlings for students to plant.

AT WINTER PARK, Fla., the High School Science Club reports with pardonable pride that 90% of the school's Honor Society members are also club members. Guests speakers during the year have presented such topics as "Ethical Hypnosis," "Bacteria and Your Life," "Religion in Science," and "Current Trends in Science Education."

BOY SCOUT Troop 106, New York City, has its own science club and is making preparations to stage a Science Show when the Greater New York Council's Boy Scout

Exposition convenes Nov. 17-19 at the Coliseum. The club is less than a year old.

A COMMITTEE of students and teachers at Sierra High School, Whittier, Calif., in cooperation with the school's Science Club, industrial arts department, business education department and art department, has published the first issue of the Sierra High School Science Journal. Students contributed articles describing science experiments done outside the classroom. Annual issues are planned.

THE MATHEMATICS Club at Mount Si High School, Route 1, Snoqualmie, Wash., built and operates a 6-inch reflector telescope, mounted on the school lawn. The instrument is used on regularly scheduled "Observation Nights."

IN CRAIG, Alaska, members of the Craig High School Science Club have set up consumer education displays in connection with canned goods sold at a local store, and have planted an arboretum at the rear of their school, with the help of the local U.S. Forest Service office.

THE 35-YEAR-OLD Bakersfield (Calif.) High School Science Club, inactive for several years in its history but "very active" for the past 16, holds evening dinner meetings with talks by visiting scientists, and conducts field trips.

THE EXPLORERS, of the Francis E. Willard School in Chicago, are making efforts to "improve the natural appearance of our school grounds."

VARIOUS ACTIVITIES of the Aquinas Club, formed last September at Queen of the Rosary Academy, Amityville, N. Y., have included a visit to a nearby missile base and a lecture by a woman engineer on career possibilities in her field. The girls think the club is still "too much in the embryonic stage to form any judgement" on their most effective programs.

ANY SCHOOL located on a street called the Avenue Louis Pasteur would almost have to have a science club, and the Boston (Mass.) Latin School has had one for a year. Its Physics-Chemistry Club has begun a program to cooperate with the school library in selecting and displaying science books.

THE CRUCIBLE Club at Toccoa High School, Toccoa, Ga., conducts assembly programs, science fairs and field trips. A recent trip found the club visiting the atomic energy plant at Aiken, S. C.

THE NATURE Club at Staughton (Mass.) Junior High does volunteer summer work at the Trailside Museum, operated by the Boston Museum of Science. Members feed animals, keep trails clean, and catch food for the smaller animals.

FULL INFORMATION on starting and sponsoring a science club is available from Science Clubs of America, 1719 N Street, N.W., Washington 6, D. C. Science teachers and other interested persons are invited to inquire. There is no charge for this service or for affiliation with SCA.

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❁ **ELECTRONIC OVEN** for office building or factory uses radar beams to transform pre-cooked, refrigerated dinners into hot meals in just one minute. Meals are on plastic, disposable tray-dishes with color-coded tape. The ovens have automatic timers with color-coded buttons to match the various dinners. The amount of energy used to heat the meal is controlled by the timers.

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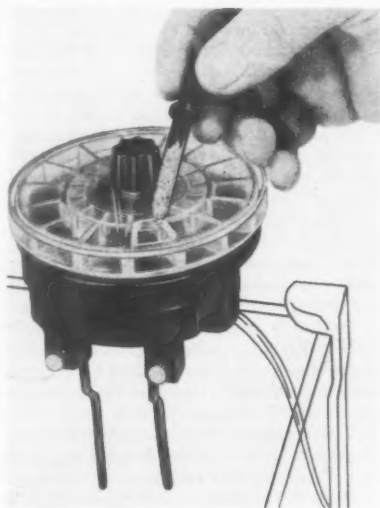
❁ **ADJUSTABLE FRUIT TRAY** is an attractive cherrywood centerpiece for dining room or coffee table. The naturally finished 11½-inch-wide tray expands to a 13-inch length or folds to a 9-inch length. It is also recommended for flower arrangements.

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❁ **VACUUM APPARATUS** for science classes provides a variety of experiments demonstrating the behavior and uses of air. Air is pumped out of a 6½-by-9-inch vacuum jar, resting on a baseplate, by a hand pump.

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❁ **ELECTRIC FISH FEEDER**, shown in the photograph, automatically feeds fish one to three times a day even if you are away on vacation. Fish food, stored in tiny com-



partments, lasts up to two weeks. The feeder attaches to nearly all rectangular or round aquariums and is powered by a quiet clock-type motor.

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❁ **ANIMAL OXYGEN TENT** converts hospital cages into oxygen tents by attach-

ing a transparent plastic panel to a standard cage door. The box-like panel has a 15-pound capacity ice chamber for cooling the cage and a single regulator controlling the flow of oxygen and degree of cooling. The unit can also use spray medication.

• Science News Letter, 80:64 July 22, 1961

❁ **TINY DENTIST DRILL** revolving 260,000 times a minute is said to reduce drilling time as much as 75%. The air turbine drill, riding on a cushion of air, vibrates little and is very quiet while drilling.

• Science News Letter, 80:64 July 22, 1961

❁ **PLASTIC INCUBATOR** for laboratories, physicians and dentists has lift-off lid revealing an 85-square-inch plastic-covered shelf with a coated wire heating element underneath. The gray, nearly three-pound unit is thermostatically controlled at 98.6 degrees Fahrenheit and uses 30 watts.

• Science News Letter, 80:64 July 22, 1961

❁ **SWIMMING AID** helps keep children afloat. A solid foam plastic simulated water lung, capable of supporting 100 pounds, is worn strapped to the back. A yellow vinyl face mask and junior-size swim fins complete the junior "frogman" outfit.

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Nature Ramblings



Do You Know?

➤ **LIKE A BIG BEE** in feathers, the hummingbird darts about the garden, suspended in mid-air on its invisibly vibrating wings while it probes deep-throated flowers for food.

* It is always a mental effort to regard this dynamic molecule of life as a bird, it is so small and flies so much more in the manner of an insect. Other small birds can hover for short moments, but the fluttering of their wings is relatively slow and one can see them as they beat. No other bird has so perfected the art of hovering flight.

In the eastern United States there is only one species of hummingbird, the ruby-throat. This one, however, ranges everywhere east of the Rockies, well up into Canada, where you would hardly expect to find tropical visitors.

For the hummingbirds in general are of the tropics, and ours is a commuter who comes north to rear a family and then returns to a warm climate for the winter. Ruby-throated hummingbirds winter all the way from Florida and Texas south to the Isthmus, and appear sporadically in Cuba; in spite of their diminutive size they are quite evidently efficient travelers.

Hummingbirds



The hummingbird does not spend all day at that dizzying occupation of flying so fast without moving from the spot. That kind of flying requires the burning up of too much energy to be kept up indefinitely. He does it in short spurts, resting in between on a slender twig or perhaps a trellis wire, preening his feathers.

Nor does the hummingbird feed, insect-wise, on honey, as is often imagined. It likes meat and is willing to take it in little bits—as tiny insects in the bottoms of the flowers. That is really what its long, probing beak is after most of the time.

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One of the most extensive uses of epoxy resin in highway application is as an adhesive for non-skid mineral dressings over slippery pavements and bridge decks.

Statistics show that in baseball there is a direct relationship between vision and playing skills.

Grasshoppers cause extensive damage to trees and shrubs in the Northern Great Plains.

Experimental studies of salamander embryos reveal that behavior patterns develop in correlation with structural development in the nervous system.

There are 160,000 miles of crude oil pipelines servicing 500,000 oil wells in the United States.

General signs of aging as manifested in appearance, skin texture and graying hair are not speeded up because of irradiation, a scientific study of survivors of the Hiroshima atomic bombing indicated.

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